TABLE OF CUBIC YARDS IN LENGTHS OF 100 FEET.

ADAPTED ESPECIALLY TO THE CALCULATION OF EARTH WORK BY THE METHOD OF AVERAGING END AREAS.

Contents of Column "A" are for the integers in column headed "Area, Square Feet."
Contents of Column "B" are for the same integers plus 0.5 square foot.

Contents for lengths greater or less than 100 are obtained by simple proportion, thus: 125 sq. ft. for length of 20 ft.$=\frac{20}{100}=\frac{1}{5}$ of 463.0 cu. yds.; the contents for 125 sq. ft.=92.6 cu. yds.

COPYRIGHT 1885 BY S. B. FISHER.

Area, Sq. Ft.	Contents, Cu. Yds. A.	B.	Area, Sq. Ft.	Contents, Cu. Yds. A.	B.	Area, Sq. Ft.	Contents, Cu. Yds. A.	B.	Area, Sq. Ft.	Contents, Cu. Yds. A.	B.	Area, Sq. Ft.	Contents, Cu. Yds. A.	B.
		1.8	100	370.4	372.2	200	740.7	742.6	300	1111.1	1113.0	400	1481.5	1483.3
1	3.7	5.6	1	374.1	375.9	1	744.4	746.3	1	1114.8	1116.7	1	1485.2	1487.0
2	7.4	9.3	2	377.8	379.6	2	748.1	750.0	2	1118.5	1120.4	2	1488.9	1490.7
3	11.1	13.0	3	381.5	383.3	3	751.9	753.7	3	1122.2	1124.1	3	1492.6	1494.4
4	14.8	16.7	4	385.2	387.0	4	755.6	757.4	4	1125.9	1127.8	4	1496.3	1498.1
5	18.5	20.4	5	388.9	390.7	5	759.3	761.1	5	1129.6	1131.5	5	1500.0	1501.8
6	22.2	24.1	6	392.6	394.4	6	763.0	764.8	6	1133.3	1135.2	6	1503.7	1505.6
7	25.9	27.8	7	396.3	398.1	7	766.7	768.5	7	1137.0	1138.9	7	1507.4	1509.3
8	29.6	31.5	8	400.0	401.8	8	770.4	772.2	8	1140.7	1142.6	8	1511.1	1513.0
9	33.3	35.2	9	403.7	405.6	9	774.1	775.9	9	1144.4	1146.3	9	1514.8	1516.7
10	37.0	38.9	110	407.4	409.3	210	777.8	779.6	310	1148.1	1150.0	410	1518.5	1520.4
1	40.7	42.6	1	411.1	413.0	1	781.5	783.3	1	1151.9	1153.7	1	1522.2	1524.1
2	44.4	46.3	2	414.8	416.7	2	785.2	787.0	2	1155.6	1157.4	2	1525.9	1527.8
3	48.1	50.0	3	418.5	420.4	3	788.9	790.7	3	1159.3	1161.1	3	1529.6	1531.5
4	51.9	53.7	4	422.2	424.1	4	792.6	794.4	4	1163.0	1164.8	4	1533.3	1535.2
5	55.6	57.4	5	425.9	427.8	5	796.3	798.1	5	1166.7	1168.5	5	1537.0	1538.9
6	59.3	61.1	6	429.6	431.5	6	800.0	801.8	6	1170.4	1172.2	6	1540.7	1542.6
7	63.0	64.8	7	433.3	435.2	7	803.7	805.6	7	1174.1	1175.9	7	1544.4	1546.3
8	66.7	68.5	8	437.0	438.9	8	807.4	809.3	8	1177.8	1179.6	8	1548.1	1550.0
9	70.4	72.2	9	440.7	442.6	9	811.1	813.0	9	1181.5	1183.3	9	1551.9	1553.7
20	74.1	75.9	120	444.4	446.3	220	814.8	816.7	320	1185.2	1187.0	420	1555.6	1557.4
1	77.8	79.6	1	448.1	450.0	1	818.5	820.4	1	1188.9	1190.7	1	1559.3	1561.1
2	81.5	83.3	2	451.9	453.7	2	822.2	824.1	2	1192.6	1194.4	2	1563.0	1564.8
3	85.2	87.0	3	455.6	457.4	3	825.9	827.8	3	1196.3	1198.1	3	1566.7	1568.5
4	88.9	90.7	4	459.3	461.1	4	829.6	831.5	4	1200.0	1201.8	4	1570.4	1572.2
5	92.6	94.4	5	463.0	464.8	5	833.3	835.2	5	1203.7	1205.6	5	1574.1	1575.9
6	96.3	98.1	6	466.7	468.5	6	837.0	838.9	6	1207.4	1209.3	6	1577.8	1579.6
7	100.0	101.8	7	470.4	472.2	7	840.7	842.6	7	1211.1	1213.0	7	1581.5	1583.3
8	103.7	105.6	8	474.1	475.9	8	844.4	846.3	8	1214.8	1216.7	8	1585.2	1587.0
9	107.4	109.3	9	477.8	479.6	9	848.1	850.0	9	1218.5	1220.4	9	1588.9	1590.7
30	111.1	113.0	130	481.5	483.3	230	851.9	853.7	330	1222.2	1224.1	430	1592.6	1594.4
1	114.8	116.7	1	485.2	487.0	1	855.6	857.4	1	1225.9	1227.8	1	1596.3	1598.1
2	118.5	120.4	2	488.9	490.7	2	859.3	861.1	2	1229.6	1231.5	2	1600.0	1601.8
3	122.2	124.1	3	492.6	494.4	3	863.0	864.8	3	1233.3	1235.2	3	1603.7	1605.6
4	125.9	127.8	4	496.3	498.1	4	866.7	868.5	4	1237.0	1238.9	4	1607.4	1609.3
5	129.6	131.5	5	500.0	501.8	5	870.4	872.2	5	1240.7	1242.6	5	1611.1	1613.0
6	133.3	135.2	6	503.7	505.6	6	874.1	875.9	6	1244.4	1246.3	6	1614.8	1616.7
7	137.0	138.9	7	507.4	509.3	7	877.8	879.6	7	1248.1	1250.0	7	1618.5	1620.4
8	140.7	142.6	8	511.1	513.0	8	881.5	883.3	8	1251.9	1253.7	8	1622.2	1624.1
9	144.4	146.3	9	514.8	516.7	9	885.2	887.0	9	1255.6	1257.4	9	1625.9	1627.8
40	148.1	150.0	140	518.5	520.4	240	883.9	890.7	340	1259.3	1261.1	440	1629.6	1631.5
1	151.9	153.7	1	522.2	524.1	1	892.6	894.4	1	1263.0	1264.8	1	1633.3	1635.2
2	155.6	157.4	2	525.9	527.8	2	896.3	898.1	2	1266.7	1268.5	2	1637.0	1638.9
3	159.3	161.1	3	529.6	531.5	3	900.0	901.8	3	1270.4	1272.2	3	1640.7	1642.6
4	163.0	164.8	4	533.3	535.2	4	903.7	905.6	4	1274.1	1275.9	4	1644.4	1646.3
5	166.7	168.5	5	537.0	538.9	5	907.4	909.3	5	1277.8	1279.6	5	1648.1	1650.0
6	170.4	172.2	6	540.7	542.6	6	911.1	913.0	6	1281.5	1283.3	6	1651.9	1653.7
7	174.1	175.9	7	544.4	546.3	7	914.8	916.7	7	1285.2	1287.0	7	1655.6	1657.4
8	177.8	179.6	8	548.1	550.0	8	918.5	920.4	8	1288.9	1290.7	8	1659.3	1661.1
9	181.5	183.3	9	551.9	553.7	9	922.2	924.1	9	1292.6	1294.4	9	1663.0	1664.8
50	185.2	187.0	150	555.6	557.4	250	925.9	927.8	350	1296.3	1298.1	450	1666.7	1668.5
1	188.9	190.7	1	559.3	561.1	1	929.6	931.5	1	1300.0	1301.8	1	1670.4	1672.2
2	192.6	194.4	2	563.0	564.8	2	933.3	935.2	2	1303.7	1305.6	2	1674.1	1675.9
3	196.3	198.1	3	566.7	568.5	3	937.0	938.9	3	1307.4	1309.3	3	1677.8	1679.6
4	200.0	201.8	4	570.4	572.2	4	940.7	942.6	4	1311.1	1313.0	4	1681.5	1683.3
5	203.7	205.6	5	574.1	575.9	5	944.4	946.3	5	1314.8	1316.7	5	1685.2	1687.0
6	207.4	209.3	6	577.8	579.6	6	948.1	950.0	6	1318.5	1320.4	6	1688.9	1690.7
7	211.1	213.0	7	581.5	583.3	7	951.9	953.7	7	1322.2	1324.1	7	1692.6	1694.4
8	214.8	216.7	8	585.2	587.0	8	955.6	957.4	8	1325.9	1327.8	8	1696.3	1698.1
9	218.5	220.4	9	588.9	590.7	9	959.3	961.1	9	1329.6	1331.5	9	1700.0	1701.8
60	222.2	224.1	160	592.6	594.4	260	963.0	964.8	360	1333.3	1335.2	460	1703.7	1705.6
1	225.9	227.8	1	596.3	598.1	1	966.7	968.5	1	1337.0	1338.9	1	1707.4	1709.3
2	229.6	231.5	2	600.0	601.8	2	970.4	972.2	2	1340.7	1342.6	2	1711.1	1713.0
3	233.3	235.2	3	603.7	605.6	3	974.1	975.9	3	1344.4	1346.3	3	1714.8	1716.7
4	237.0	238.9	4	607.4	609.3	4	977.8	979.6	4	1348.1	1350.0	4	1718.5	1720.4
5	240.7	242.6	5	611.1	613.0	5	981.5	983.3	5	1351.9	1353.7	5	1722.2	1724.1
6	244.4	246.3	6	614.8	616.7	6	985.2	987.0	6	1355.6	1357.4	6	1725.9	1727.8
7	248.1	250.0	7	618.5	620.4	7	988.9	990.7	7	1359.3	1361.1	7	1729.6	1731.5
8	251.9	253.7	8	622.2	624.1	8	992.6	994.4	8	1363.0	1364.8	8	1733.3	1735.2
9	255.6	257.4	9	625.9	627.8	9	996.3	998.1	9	1366.7	1368.5	9	1737.0	1738.9
70	259.3	261.1	170	629.6	631.5	270	1000.0	1001.8	370	1370.4	1372.2	470	1740.7	1742.6
1	263.0	264.8	1	633.3	635.2	1	1003.7	1005.6	1	1374.1	1375.9	1	1744.4	1746.3
2	266.7	268.5	2	637.0	638.9	2	1007.4	1009.3	2	1377.8	1379.6	2	1748.1	1750.0
3	270.4	272.2	3	640.7	642.6	3	1011.1	1013.0	3	1381.5	1383.3	3	1751.9	1753.7
4	274.1	275.9	4	644.4	646.3	4	1014.8	1016.7	4	1385.2	1387.0	4	1755.6	1757.4
5	277.8	279.6	5	648.1	650.0	5	1018.5	1020.4	5	1388.9	1390.7	5	1759.3	1761.1
6	281.5	283.3	6	651.9	653.7	6	1022.2	1024.1	6	1392.6	1394.4	6	1763.0	1764.8
7	285.2	287.0	7	655.6	657.4	7	1025.9	1027.8	7	1396.3	1398.1	7	1766.7	1768.5
8	288.9	290.7	8	659.3	661.1	8	1029.6	1031.5	8	1400.0	1401.8	8	1770.4	1772.2
9	292.6	294.4	9	663.0	664.8	9	1033.3	1035.2	9	1403.7	1405.6	9	1774.1	1775.9
80	296.3	298.1	180	666.7	668.5	280	1037.0	1038.9	380	1407.4	1409.3	480	1777.8	1779.6
1	300.0	301.8	1	670.4	672.2	1	1040.7	1042.6	1	1411.1	1413.0	1	1781.5	1783.3
2	303.7	305.6	2	674.1	675.9	2	1044.4	1046.3	2	1414.8	1416.7	2	1785.2	1787.0
3	307.4	309.3	3	677.8	679.6	3	1048.1	1050.0	3	1418.5	1420.4	3	1788.9	1790.7
4	311.1	313.0	4	681.5	683.3	4	1051.9	1053.7	4	1422.2	1424.1	4	1792.6	1794.4
5	314.8	316.7	5	685.2	687.0	5	1055.6	1057.4	5	1425.9	1427.8	5	1796.3	1798.1
6	318.5	320.4	6	688.9	690.7	6	1059.3	1061.1	6	1429.6	1431.5	6	1800.0	1801.8
7	322.2	324.1	7	692.6	694.4	7	1063.0	1064.8	7	1433.3	1435.2	7	1803.7	1805.6
8	325.9	327.8	8	696.3	698.1	8	1066.7	1068.5	8	1437.0	1438.9	8	1807.4	1809.3
9	329.6	331.5	9	700.0	701.8	9	1070.4	1072.2	9	1440.7	1442.6	9	1811.1	1813.0
90	333.3	335.2	190	703.7	705.6	290	1074.1	1075.9	390	1444.4	1446.3	490	1814.8	1816.7
1	337.0	338.9	1	707.4	709.3	1	1077.8	1079.6	1	1448.1	1450.0	1	1818.5	1820.4
2	340.7	342.6	2	711.1	713.0	2	1081.5	1083.3	2	1451.9	1453.7	2	1822.2	1824.1
3	344.4	346.3	3	714.8	716.7	3	1085.2	1087.0	3	1455.6	1457.4	3	1825.9	1827.8
4	348.1	350.0	4	718.5	720.4	4	1088.9	1090.7	4	1459.3	1461.1	4	1829.6	1831.5
5	351.9	353.7	5	722.2	724.1	5	1092.6	1094.4	5	1463.0	1464.8	5	1833.3	1835.2
6	355.6	357.4	6	725.9	727.8	6	1096.3	1098.1	6	1466.7	1468.5	6	1837.0	1838.9
7	359.3	361.1	7	729.6	731.5	7	1100.0	1101.8	7	1470.4	1472.2	7	1840.7	1842.6
8	363.0	364.8	8	733.3	735.2	8	1103.7	1105.6	8	1474.1	1475.9	8	1844.4	1846.3
9	366.7	368.5	9	737.0	738.9	9	1107.4	1109.3	9	1477.8	1479.6	9	1848.1	1850.0
100	370.4	372.2	200	740.7	742.6	300	1111.1	1113.0	400	1481.5	1483.3	500	1851.9	1853.7

Area, Sq. Ft.	Contents, Cu. Yds. A.	B.	Area, Sq. Ft.	Contents, Cu. Yds. A.	B.	Area, Sq. Ft.	Contents, Cu. Yds. A.	B.	Area, Sq. Ft.	Contents, Cu. Yds. A.	B.	Area, Sq. Ft.	Contents, Cu. Yds. A.	B.
500	1851.9	1853.7	600	2222.2	2224.1	700	2592.6	2594.4	800	2963.0	2964.8	900	3333.3	3335.2
1	1855.6	1857.4	1	2225.9	2227.8	1	2596.3	2598.1	1	2966.7	2968.5	1	3337.0	3338.9
2	1859.3	1861.1	2	2229.6	2231.5	2	2600.0	2601.8	2	2970.4	2972.2	2	3340.7	3342.6
3	1863.0	1864.8	3	2233.3	2235.2	3	2603.7	2605.6	3	2974.1	2975.9	3	3344.4	3346.3
4	1866.7	1868.5	4	2237.0	2238.9	4	2607.4	2609.3	4	2977.8	2979.6	4	3348.1	3350.0
5	1870.4	1872.2	5	2240.7	2242.6	5	2611.1	2613.0	5	2981.5	2983.3	5	3351.9	3353.7
6	1874.1	1875.9	6	2244.4	2246.3	6	2614.8	2616.7	6	2985.2	2987.0	6	3355.6	3357.4
7	1877.8	1879.6	7	2248.1	2250.0	7	2618.5	2620.4	7	2988.9	2990.7	7	3359.3	3361.1
8	1881.5	1883.3	8	2251.9	2253.7	8	2622.2	2624.1	8	2992.6	2994.4	8	3363.0	3364.8
9	1885.2	1887.0	9	2255.6	2257.4	9	2625.9	2627.8	9	2996.3	2998.1	9	3366.7	3368.5
510	1888.9	1890.7	610	2259.3	2261.1	710	2629.6	2631.5	810	3000.0	3001.8	910	3370.4	3372.2
1	1892.6	1894.4	1	2263.0	2264.8	1	2633.3	2635.2	1	3003.7	3005.6	1	3374.1	3375.9
2	1896.3	1898.1	2	2266.7	2268.5	2	2637.0	2638.9	2	3007.4	3009.3	2	3377.8	3379.6
3	1900.0	1901.8	3	2270.4	2272.2	3	2640.7	2642.6	3	3011.1	3013.0	3	3381.5	3383.3
4	1903.7	1905.6	4	2274.1	2275.9	4	2644.4	2646.3	4	3014.8	3016.7	4	3385.2	3387.0
5	1907.4	1909.3	5	2277.8	2279.6	5	2648.1	2650.0	5	3018.5	3020.4	5	3388.9	3390.7
6	1911.1	1913.0	6	2281.5	2283.3	6	2651.9	2653.7	6	3022.2	3024.1	6	3392.6	3394.4
7	1914.8	1916.7	7	2285.2	2287.0	7	2655.6	2657.4	7	3025.9	3027.8	7	3396.3	3398.1
8	1918.5	1920.4	8	2288.9	2290.7	8	2659.3	2661.1	8	3029.6	3031.5	8	3400.0	3401.8
9	1922.2	1924.1	9	2292.6	2294.4	9	2663.0	2664.8	9	3033.3	3035.2	9	3403.7	3405.6
520	1925.9	1927.8	620	2296.3	2298.1	720	2666.7	2668.5	820	3037.0	3038.9	920	3407.4	3409.5
1	1929.6	1931.5	1	2300.0	2301.8	1	2670.4	2672.2	1	3040.7	3042.6	1	3411.1	3413.0
2	1933.3	1935.2	2	2303.7	2305.6	2	2674.1	2675.9	2	3044.4	3046.3	2	3414.8	3416.7
3	1937.0	1938.9	3	2307.4	2309.3	3	2677.8	2679.6	3	3048.1	3050.0	3	3418.5	3420.4
4	1940.7	1942.6	4	2311.1	2313.0	4	2681.5	2683.3	4	3051.9	3053.7	4	3422.2	3424.1
5	1944.4	1946.3	5	2314.8	2316.7	5	2685.2	2687.0	5	3055.6	3057.4	5	3425.9	3427.8
6	1948.1	1950.0	6	2318.5	2320.4	6	2688.9	2690.7	6	3059.3	3061.1	6	3429.6	3431.5
7	1951.9	1953.7	7	2322.2	2324.1	7	2692.6	2694.4	7	3063.0	3064.8	7	3433.3	3435.2
8	1955.6	1957.4	8	2325.9	2327.8	8	2696.3	2698.1	8	3066.7	3068.5	8	3437.0	3438.9
9	1959.3	1961.1	9	2329.6	2331.5	9	2700.0	2701.8	9	3070.4	3072.2	9	3440.7	3442.6
530	1963.0	1964.8	630	2333.3	2335.2	730	2703.7	2705.6	830	3074.1	3075.9	930	3444.4	3446.3
1	1966.7	1968.5	1	2337.0	2338.9	1	2707.4	2709.3	1	3077.8	3079.6	1	3448.1	3450.0
2	1970.4	1972.2	2	2340.7	2342.6	2	2711.1	2713.0	2	3081.5	3083.3	2	3451.9	3453.7
3	1974.1	1975.9	3	2344.4	2346.3	3	2714.8	2716.7	3	3085.2	3087.0	3	3455.6	3457.4
4	1977.8	1979.6	4	2348.1	2350.0	4	2718.5	2720.4	4	3088.9	3090.7	4	3459.3	3461.1
5	1981.5	1983.3	5	2351.9	2353.7	5	2722.2	2724.1	5	3092.6	3094.4	5	3463.0	3464.8
6	1985.2	1987.0	6	2355.6	2357.4	6	2725.9	2727.8	6	3096.3	3098.1	6	3466.7	3468.5
7	1988.9	1990.7	7	2359.3	2361.1	7	2729.6	2731.5	7	3100.0	3101.8	7	3470.4	3472.2
8	1992.6	1994.4	8	2363.0	2364.8	8	2733.3	2735.2	8	3103.7	3105.6	8	3474.1	3475.9
9	1996.3	1998.1	9	2366.7	2368.5	9	2737.0	2738.9	9	3107.4	3109.3	9	3477.8	3479.6
540	2000.0	2001.8	640	2370.4	2372.2	740	2740.7	2742.6	840	3111.1	3113.0	940	3481.5	3483.3
1	2003.7	2005.6	1	2374.1	2375.9	1	2744.4	2746.3	1	3114.8	3116.7	1	3485.2	3487.0
2	2007.4	2009.3	2	2377.8	2379.6	2	2748.1	2750.0	2	3118.5	3120.4	2	3488.9	3490.7
3	2011.1	2013.0	3	2381.5	2383.3	3	2751.9	2753.7	3	3122.2	3124.1	3	3492.6	3494.4
4	2014.8	2016.7	4	2385.2	2387.0	4	2755.6	2757.4	4	3125.9	3127.8	4	3496.3	3498.1
5	2018.5	2020.4	5	2388.9	2390.7	5	2759.3	2761.1	5	3129.6	3131.5	5	3500.0	3501.8
6	2022.2	2024.1	6	2392.6	2394.4	6	2763.0	2764.8	6	3133.3	3135.2	6	3503.7	3505.6
7	2025.9	2027.8	7	2396.3	2398.1	7	2766.7	2768.5	7	3137.0	3138.9	7	3507.4	3509.3
8	2029.6	2031.5	8	2400.0	2401.8	8	2770.4	2772.2	8	3140.7	3142.6	8	3511.1	3513.0
9	2033.3	2035.2	9	2403.7	2405.6	9	2774.1	2775.9	9	3144.4	3146.3	9	3514.8	3516.7
550	2037.0	2038.9	650	2407.4	2409.3	750	2777.8	2779.6	850	3148.1	3150.0	950	3518.5	3520.4
1	2040.7	2042.6	1	2411.1	2413.0	1	2781.5	2783.3	1	3151.9	3153.7	1	3522.2	3524.1
2	2044.4	2046.3	2	2414.8	2416.7	2	2785.2	2787.0	2	3155.6	3157.4	2	3525.9	3527.8
3	2048.1	2050.0	3	2418.5	2420.4	3	2788.9	2790.7	3	3159.3	3161.1	3	3529.6	3531.5
4	2051.9	2053.7	4	2422.2	2424.1	4	792.6	2794.4	4	3163.0	3164.8	4	3533.3	3535.2
5	2055.6	2057.4	5	2425.9	2427.8	5	2796.3	2798.1	5	3166.7	3168.5	5	3537.0	3538.9
6	2059.3	2061.1	6	2429.6	2431.5	6	2800.0	2801.8	6	3170.4	3172.2	6	3540.7	3542.6
7	2063.0	2064.8	7	2433.3	2435.2	7	2803.7	2805.6	7	3174.1	3175.9	7	3544.4	3546.3
8	2066.7	2068.5	8	2437.0	2438.9	8	2807.4	2809.3	8	3177.8	3179.6	8	3548.1	3550.0
9	2070.4	2072.2	9	2440.7	2442.6	9	2811.1	2813.0	9	3181.5	3183.3	9	3551.9	3553.7
560	2074.1	2075.9	660	2444.4	2446.3	760	2814.8	2816.7	860	3185.2	3187.0	960	3555.6	3557.4
1	2077.8	2079.6	1	2448.1	2450.0	1	2818.5	2820.4	1	3188.9	3190.7	1	3559.3	3561.1
2	2081.5	2083.3	2	2451.9	2453.7	2	2822.2	2824.1	2	3192.6	3194.4	2	3563.0	3564.8
3	2085.2	2087.0	3	2455.6	2457.4	3	2825.9	2827.8	3	3196.3	3198.1	3	3566.7	3568.5
4	2088.9	2090.7	4	2459.3	2461.1	4	2829.6	2831.5	4	3200.0	3201.8	4	3570.4	3572.2
5	2092.6	2094.4	5	2463.0	2464.8	5	2833.3	2835.2	5	3203.7	3205.6	5	3574.1	3575.9
6	2096.3	2098.1	6	2466.7	2468.5	6	2837.0	2838.9	6	3207.4	3209.3	6	3577.8	3579.6
7	2100.0	2101.8	7	2470.4	2472.2	7	2840.7	2842.6	7	3211.1	3213.0	7	3581.5	3583.3
8	2103.7	2105.6	8	2474.1	2475.9	8	2844.4	2846.3	8	3214.8	3216.7	8	3585.2	3587.0
9	2107.4	2109.3	9	2477.8	2479.6	9	2848.1	2850.0	9	3218.5	3220.4	9	3588.9	3590.7
570	2111.1	2113.0	670	2481.5	2483.3	770	2851.9	2853.7	870	3222.2	3224.1	970	3592.6	3594.4
1	2114.8	2116.7	1	2485.2	2487.0	1	2855.6	2857.4	1

3 0112 106077396

RATIOS OF CORRECTION FOR AVERAGE END AREA CALCULATIONS.

WIDTH OF ROAD BED.		1			2—12			14			16			18			20			22			24			26			28			30						
Area of Small End.		1.25	2	2.5	2.25	to	100	100			100			100			100			100			100			100			100			100						
Height of Small End.		1	1	1	1—5			6.04	5.2	4.74	5.74	4.81	4.41	5.14	4.45	4.13	4.72	4.14	3.88	4.33	3.87	3.64	4.00	3.62	3.43	3.71	3.43	3.24	3.47	3.20	3.07	3.24	3.20	2.91				
Ratio of End Areas.	Section Varying on all Sides.	Slope.			Slope.			Slope.			Slope.			Slope.			Slope.			Slope.			Slope.			Slope.			Slope.			Slope.						Ratio of End Areas.
		¼:1	1:1	1½:1	¼:1	1:1	1½:1	¼:1	1:1	1½:1	¼:1	1:1	1½:1	¼:1	1:1	1½:1	¼:1	1:1	1½:1	¼:1	1:1	1½:1	¼:1	1:1	1½:1	¼:1	1:1	1½:1	¼:1	1:1	1½:1	¼:1	1:1	1½:1				
1:1																																					1:1
1:1.2	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.....	.001	.001	.....	.001	.001	.....	.001	.001	.....	.001	.001	.....	.001	.001	.....	.001	.001	.....	.001	.001	.....	.001	.001				1:1.2
1:1.4	.002	.003	.004	.004	.002	.004	.004	.002	.003	.003	.001	.003	.003	.001	.003	.003	.001	.003	.003	.001	.003	.003	.001	.003	.003	.001	.002	.003	.001	.002	.002	.001	.002	.002				1:1.4
1:1.6	.007	.006	.007	.008	.004	.006	.007	.003	.006	.006	.002	.006	.006	.002	.006	.006	.002	.005	.005	.002	.005	.005	.002	.005	.005	.002	.004	.005	.001	.004	.005	.001	.004	.005				1:1.6
1:1.8	.012	.010	.012	.012	.006	.010	.011	.005	.010	.010	.003	.010	.010	.003	.009	.009	.003	.008	.009	.003	.007	.008	.003	.007	.008	.003	.006	.008	.002	.006	.007	.002	.006	.007				1:1.8
1:2	.019	.014	.018	.022	.009	.014	.015	.006	.014	.014	.005	.014	.014	.005	.013	.013	.005	.012	.013	.005	.011	.013	.005	.010	.012	.005	.009	.011	.003	.009	.010	.003	.008	.010				1:2
1:2.5	.033	.023	.032	.033	.016	.026	.027	.012	.024	.026	.010	.024	.025	.010	.022	.024	.010	.020	.023	.009	.019	.021	.010	.017	.020	.008	.016	.019	.006	.015	.018	.005	.014	.017				1:2.5
1:3	.045	.032	.043	.044	.023	.037	.040	.019	.035	.037	.016	.033	.035	.014	.031	.034	.014	.028	.033	.014	.026	.030	.013	.025	.028	.012	.023	.027	.010	.022	.025	.008	.021	.024				1:3
1:3.5	.056	.041	.055	.056	.030	.047	.051	.026	.045	.047	.022	.042	.047	.020	.039	.044	.019	.037	.042	.019	.034	.039	.017	.032	.036	.016	.030	.034	.013	.029	.033	.011	.027	.032				1:3.5
1:4	.067	.050	.066	.067	.038	.057	.061	.033	.054	.056	.029	.051	.054	.025	.048	.052	.023	.045	.050	.022	.042	.047	.021	.039	.045	.019	.037	.042	.016	.035	.040	.014	.034	.039				1:4
1:4.5	.076	.057	.075	.076	.043	.066	.070	.039	.062	.065	.035	.059	.062	.031	.055	.060	.028	.053	.058	.026	.049	.055	.024	.046	.052	.022	.044	.050	.019	.041	.048	.016	.040	.046				1:4.5
1:5	.085	.065	.083	.084	.049	.074	.078	.044	.070	.072	.040	.066	.070	.036	.063	.068	.033	.060	.066	.030	.056	.062	.028	.053	.059	.025	.050	.057	.022	.048	.054	.019	.045	.052				1:5
1:5.5	.093	.071	.091	.092	.055	.081	.084	.050	.077	.080	.046	.073	.078	.042	.070	.075	.037	.066	.073	.034	.062	.069	.031	.059	.066	.028	.055	.063	.025	.053	.060	.021	.050	.058				1:5.5
1:6	.100	.077	.098	.100	.060	.088	.093	.055	.084	.088	.051	.079	.085	.047	.076	.082	.041	.072	.079	.037	.068	.075	.034	.064	.072	.031	.060	.069	.027	.058	.066	.024	.055	.064				1:6
1:6.5	.107	.083	.105	.106	.065	.094	.099	.060	.090	.095	.056	.085	.091	.051	.082	.088	.045	.078	.085	.041	.074	.081	.037	.070	.077	.034	.065	.075	.030	.063	.072	.026	.060	.069				1:6.5
1:7	.113	.089	.110	.111	.070	.100	.105	.065	.095	.101	.060	.091	.097	.055	.088	.093	.049	.083	.090	.044	.079	.086	.040	.075	.082	.037	.070	.080	.033	.067	.077	.029	.064	.074				1:7
1:7.5	.119	.094	.115	.116	.075	.105	.110	.069	.100	.105	.064	.096	.102	.058	.093	.098	.053	.088	.095	.047	.084	.091	.043	.080	.087	.040	.075	.085	.036	.072	.082	.031	.068	.079				1:7.5
1:8	.124	.100	.120	.122	.079	.110	.115	.073	.106	.111	.068	.101	.107	.062	.098	.103	.056	.093	.100	.050	.089	.095	.047	.084	.092	.043	.080	.089	.038	.076	.086	.034	.072	.084				1:8
1:8.5	.128	.106	.125	.127	.084	.115	.120	.077	.111	.116	.072	.106	.112	.065	.102	.108	.060	.097	.104	.054	.094	.100	.050	.088	.097	.046	.084	.094	.041	.080	.091	.036	.076	.088				1:8.5
1:9	.133	.111	.130	.132	.088	.120	.125	.082	.116	.121	.076	.111	.117	.069	.106	.113	.063	.102	.109	.057	.098	.105	.053	.093	.101	.048	.088	.098	.044	.084	.095	.039	.079	.092				1:9
1:9.5	.138	.117	.134	.136	.092	.125	.130	.086	.121	.125	.086	.116	.121	.072	.111	.117	.066	.106	.113	.060	.103	.110	.056	.098	.106	.051	.093	.102	.046	.088	.100	.041	.083	.096				1:9.5
1:10	.142	.123	.138	.140	.097	.130	.135	.090	.126	.130	.084	.120	.126	.075	.116	.122	.069	.111	.118	.063	.107	.114	.059	.102	.110	.054	.097	.107	.049	.092	.104	.044	.087	.100				1:10

On Estimating Earthwork.

The accompanying table is designed to facilitate the computation of earthwork after the areas of the cross sections have been obtained. The areas may be obtained by calculation from the field notes; or the cross sections may be plotted and the areas obtained by the planimeter. The former method is short and easy in a level country, but where the surface of the ground is broken and irregular the latter method is to be preferred. Plotting the cross sections also makes a complete record of the work, with its classification at every point, and allows revision and deviation within the limits to which the section is taken, by simply indicating the position of the centre line. Usually it will be found easiest to plot the rods from a line assumed as the height of instrument; but when the work is extended so as to involve several heights of instrument in the same section, or when the work is to be used for a great number of calculations for successive estimates, it will be found cheapest to work from elevations.

A convenient form for the estimate sheets is here shown. In the two first columns are entered the stations and pluses at which the cross sections are taken. The column headed "*Length in Feet*" is filled up by subtracting the numbers in these two first columns. The columns headed "*Area of Cross Section*" are filled up with areas obtained either from calculation or from measurement by the planimeter. In the columns headed "*Average Area*" are entered one-half the sums of the areas of adjacent cross sections. If preferred the sums, instead of the half sums, may be used, in which case the final contents will be doubled.

The main columns of "*Contents in Cubic Yards*" are now filled up by aid of accompanying "*Table of Cubic Yards in Lengths of* 100 *Feet.*" If the lengths are 100 feet the corresponding quantities are simply transferred from the table. If the distance is 50 feet, one half the quantity is transferred. If the distance is 25 feet, one-fourth, &c. Usually the operation can be performed mentally. The table being set up before one, the arrangement of it is such that the eye knows just where to strike for a quantity. There are no leaves to turn. Quantities can be entered as fast as one can write. Blue ink may be used in writing quantities in excavation, and red ink in writing quantities in embankment.

The calculation of earthwork by the method of averaging end areas is not theoretically correct, excepting in the two special cases: one when the end areas are equal, and the other when the prismoid has two of its longitudinal bounding planes parallel. As that portion of every roadway prismoid, which lies between the vertical planes passing through the edges of the roadbed is practically included in the latter condition, it follows that the variation from the true contents, obtained from averaging end areas, lies outside the central roadbed prism, and we may consider it as dependent on the four following factors:

1st. The ratio of the end areas of the prismoid.

2nd. The width of the roadbed.

3rd. The degree of the slope.

4th. The heighth of the section.

This variation has been investigated with the result shown in the table called "*Ratios of Correction for Average End Area Calculations.*" The manner of proceeding was briefly thus: With the data shown in the heads of the columns in the table, and in the left hand column, the true contents of the prisms by the prismoidal formula were found, as well as the contents, by averaging end areas. The ratio of variation in many particular cases being thus found, the curve of variation for each class was formed by measuring the ratios of end areas on the axis of abscissas, and the percentages of variation on the axis of ordinates. Some maxima and minima of these curves were also traced, which seemed to differ, in extreme cases, 10 per cent. or so from the mean given in the table. It is believed these deviations will usually counterbalance one another. If the work is of a peculiar nature, so the general cases here worked out will not apply, corrections applying to it can be worked out and entered in one of the blank columns.

To apply the table of corrections, we divide one area of cross section by its neighbor, and take from the table its corresponding ratio or percentage of correction and multiply the contents by it, writing the result in the column headed "*Correction.*" The special case, when one end is zero, or ends at grade, is not provided for in table of corrections. For this case the correction is, the slope area multiplied by one sixth the length. For the road bed area being the base of a wedge, the solidity is one-half base multiplied by altitude; but the slope areas being bases of pyramids, the solidity is one-third base multiplied by altitude. One half which is used, less one-third, which should be used, equals the correction, one-sixth. This correction, as well as all others, is to be deducted from contents in main column.

Estimated Quantities in Grading

STATIONS. No.	+ Feet.	AREA OF CROSS SECTION IN SQUARE FT. Excavation. Earth.	Loose Rock.	Solid Rock.	Embankment	AVERAGE AREA. Excavation. Earth.	Loose Rock.	Solid Rock.	Embankment	Length in Feet.	CONTENTS IN CUBIC YARDS. Excavation. Earth.	Cor.	Loose Rock.	Cor.	Solid Rock.	Cor.	Embankment.	Cor.	REMARKS.
117	50	Cut commences																	
118	....	18	16	30	.....	9	8	15	.....	50	16.7	1	14 8	1	27.8	2	.....	.....	
.....	50	158	53	105	.....	88	34½	67½	.....	50	162.9	16	63.9	2	125.0	4	.....	.....	
119	....	630	163	325	.....	394	108	215½	.....	50	729.6	32	200.6	6	399.1	11	.....	.....	
.....	50	638	263	526	.....	634	212	426	.....	50	1174.1	....	394 4	3	788.9	4	.....	.....	
.....	85	417	297	595	.....	527½	280	560½	.....	35	683.8	2	362.9	....	626.5	....	.....	.....	
120	....	110	243	485	.....	263½	270	540	.....	15	136 3	4	150 0	....	300.0	3	.....	.....	
.....	20	Cut ends			.....	55	121½	242½	.....	20	40.7	....	90.0	2	179.6	4	.....	.....	
.....	40	Cut commences			68	.....	.....	.....	34	20	.....	.....	.....	.....	.....	.....	25.1	3	
.....	60	31	.....	.....	.....	15½	.....	.....	34	20	11.4	....	.....	.....	.....	.....	25.1	....	
.....	80	103	.....	.....	.....	72	.....	.....	.....	20	53.3	1	.....	.....	.....	.....	.....	.....	
121	....	334	280	560	.....	218½	170	280	.....	20	161.9	4	103.7	3	207.4	6	.....	.....	
.....	35	700	277	555	.....	517	278½	557½	.....	35	670.2	13	361.0	....	722.7	....	.....	.....	
.....	50	743	157	314	.....	521½	217	434½	.....	15	400 8	....	120 6	1	241.3	1	.....	.....	
122	50	870	156	209	.....	806½	156½	261½	.....	100	2987.0	3	579 6	....	968.5	4	.....	.....	
123	..	821	187	255	.....	845½	171½	232	.....	50	1565.7	....	317.6	....	429 6	....	.....	.....	
.....	30	534	73	147	.....	677½	130	201	.....	30	752.8	4	144.4	3	223.3	3	.....	.....	
.....	61	Cut ends			.....	267	36½	73½	.....	31	306.5	18	41.9	2	84.4	4	.....	.....	
.....	70	.....	.....	.....	46	.....	.....	.....	23	9	.....	.....	.....	.....	.....	.....	7.6	....	
.....	84	.....	.....	.....	46	.....	.....	.....	46	14	.....	.....	.....	.....	.....	.....	23.8	1	
.....	90	Cut commences				.....	.....	.....	23	6	.....	.....	.....	.....	.....	.....	5.1	....	
											9853.7	98	2945.4	23	5324.1	46	86.7	4	
		CORRECTED TOTALS,									9755.7	....	2922.4	....	5278.1	....	82.7	....	

The error from calculation by averaging end areas is not so great as appears at first sight, or as it is often represented. Taking isolated cases, where the ratio of end areas is great, it may be made to appear that the error is 10 or 15 per cent.; but taking extended work the whole error is trifling, the great bulk of consecutive cross sections being nearly equal to each other, and the errors are distributed. The writer tested one section of 28,000 cu. yds. and found the error less than one-third of one per cent. What appeared to be a section which would show great error on account of crossing several short ravines and gullies, containing some 85,000 cu. yds., was less than one-half of one per cent. out of the way.

In earthwork there are only two sides of the prismoid perfect planes, and these two are the theoretical planes of the cross section. The surface of the ground is never a perfect plane. The rod, in taking points usually sinks a little in the ground, the slopes are not trimmed exactly, nor the grade made perfect. If there is any difference between the true solidity and that obtained by the method here presented, it is the conviction of the writer that it would be easier and cheaper for the engineer to shovel it than to calculate it.

The method of calculation for earthwork should be direct and simple, so it can be used safely by assistants not specially skilled in intricate calculations. It is better for the engineer to spend much of his time in the field, minutely observing and closely measuring the work, than to spend it mainly in the office, basing refined computations on erroneous or careless measurements. The errors in measurement will usually be greater than the errors of calculation, by averaging end areas without correction.

PRICE 25 CENTS.

—Published by—

JOHN WILEY & SONS,

Scientific Publishers

15 Astor Place. NEW YORK CITY.

The New and Complete Catalogue

OF THE PUBLICATIONS OF

JOHN WILEY & SONS,

15 Astor Place, New York,

CONTAINING

Scientific and other Text Books

FOR

COLLEGES, INDUSTRIAL SCHOOLS & THEOLOGICAL SEMINARIES,

with many valuable practical works for

ARCHITECTS, ENGINEERS, MECHANICS, ETC.

INCLUDING WORKS ON

Agriculture, Assaying, Astronomy, Book-keeping, Chemistry, Drawing and Painting, Engineering, Metallurgy, Machinery, Mechanics, Mineralogy, Seamanship, Steam Engine, Ventilation, Etc., Etc., and for

THEOLOGICAL SEMINARIES,

Hebrew and Greek Bibles, Testaments, Lexicons, Grammars, Reading Books and Concordances.

also a full list of their editions of

JOHN RUSKIN'S WORKS.

Will be sent free by mail to anyone ordering it.